

What is claimed is:

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1. A game device for displaying, as a picture, a scene having come into view by moving a visual point in a three-dimensional virtual space, said game device comprising flare processing means for forming a flare in said picture when a light source exists within
10 view of said visual point, said flare processing means comprising:

line-of-sight vector generating means for obtaining a line-of-sight vector which shows a line-of-sight direction of said visual point;

ray vector generating means for obtaining a ray vector which
15 shows a direction of the light source from said visual point;

inner product calculating means for calculating an inner product of said line-of-sight vector and said ray vector; and

flare forming means for forming a flare having intensity according to said inner product in said picture.

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2. A game device according to claim 1, wherein said flare processing means further comprises determining means for activating said flare forming means on the basis of results of comparison of said inner product with a reference value.

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3. A game device according to claim 1, wherein said flare forming means increases a degree of whiteness of said picture in accordance with said inner product.

4. A game device according to claim 1, wherein said flare forming means forms a picture of a flare polygon having transparency according to said inner product.

5 5. A game device according to claim 1, wherein said flare
forming means conducts, with said inner product being between a
predetermined upper limit and a predetermined lower limit, the
processing to add whiteness to the picture according to said inner
product and/or the processing to form a flare polygon having
10 transparency according to said inner product.

6. A game device according to claim 1, wherein said flare forming means forms said flare on a straight line linking said visual point with said light source.

7. A game device for displaying, as a picture, a scene having come into view by moving a visual point in a three-dimensional virtual space, said game device comprising flare processing means for forming a flare in said picture when a light source exists within view of said visual point, said flare processing means determining a degree of said flare in accordance with a position of said light source within view and/or intensity of said light source.

8. A game device according to claim 7, wherein said flare
25 processing means determines the degree of said flare by referring
to a table containing a group of flare values, said table matching
the degree of said flare to the position of said light source within
view and/or the intensity of said light source.

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9. A game device according to claim 7, wherein said flare processing means finds the degree of said flare by using a function including as a variable of the position of said light source within view and/or the intensity of said light source.

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10. A game device according to claim 7, wherein said flare processing means expresses the flare by displaying, on a screen, a flat figure having a comparatively higher degree of whiteness than that of the background or a hollow flat figure.

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11. A game device according to claim 10, wherein said flare processing means repeats display and no display of said flare in a short period of time.

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12. A game device according to claim 7, wherein said flare processing means displays a plurality of said flares on a straight line corresponding to an incident ray.

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13. A game device according to claim 12, wherein said plurality of flares displayed include similar figures.

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14. A game device according to claim 7, wherein said light source is a virtual sun located in said three-dimensional virtual space, said sun being relocated from a normal position in said three-dimensional virtual space to a position within view of a predetermined scene in order to generate said flare in said picture on the predetermined scene.

15. A game device for displaying, as a picture, an object

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moving in accordance with developments of a game, said game device comprising:

means for reading a present position of said object;

and

- 5 trace mark drawing means for drawing a trace mark in length within a predetermined range from said present position and for extinguishing a bottom position of said trace mark by making it gradually lighter in color with the lapse of time.

- 10 16. A game device according to claim 15, wherein said trace mark consists of plural portions, each portion having an assigned trace pattern which becomes lighter from the top position toward the bottom position of said trace mark.

- 15 17. A game device according to claim 16, wherein the trace pattern assigned to said each portion is previously stored as a pattern having different density in a storage means.

- 20 18. A game device according to claim 16, wherein said trace pattern assigned to said each portion is obtained by changing the transparency of a basic trace pattern.

- 25 19. A game device according to claim 15, wherein said trace mark drawing means extends only the top position of said trace mark when the present position of said object is located less than a predetermined value apart from the top position of the drawn trace mark, and said trace mark drawing means moves, by said predetermined value, said trace mark in its entirety toward the present position of said object when the present position of said object is located

not less than said predetermined value apart from the top position of the drawn trace mark.

20. A game device according to claim 15, wherein said trace
5 mark drawing means adjusts the timing to extinguish the drawn trace according to a moving speed of said object.

21. A game device according to claim 15, wherein said trace
10 mark drawing means does not extinguish the drawn trace mark when said object stands still, while said trace mark drawing means extinguishes the drawn trace mark at a speed according to a moving speed of said object when said object is moving.

22. A game device according to claim 15, wherein said trace
15 mark drawing means deletes the drawn trace mark when said object stops and a predetermined time has passed.

23. A game device according to claim 16, wherein said trace
20 mark drawing means has: a cyclic register for retaining positions of respective portions of a mark, which consists of said plural portions, in a plurality of storage regions which respectively relate to the respective portions of the mark;
and mark top position indicating means for indicating a storage region of the cyclic register, which corresponds to the top position
25 of a mark.

24. A medium with a program stored thereon, the program for making a computer system function as a game device according to claim 1.

25. A method of forming picture data, comprising the steps of:

5 locating an object composed of polygons in a three-dimensional virtual space;

setting a visual point in the three-dimensional virtual space and forming a projected picture by projecting polygons in a display region as seen from this visual point on a plane of projection;

identifying whether each polygon is visible or invisible from
10 said visual point according to the projected picture formed on said
plane of projection;

forming object data from data showing whether each polygon is visible or invisible; and

relating said visual point with the object data.

26. A method of forming picture data, comprising the steps of:

locating all objects composed of polygons in a three-dimensional virtual space;

20 setting a plurality of visual points in the three-dimensional
virtual space;

forming a projected picture for each visual point by projecting, on a plane of projection for each visual point, the polygons within a display region as seen from each visual point;

25 identifying whether each polygon is visible or invisible from
each visual point according to the projected picture formed on said
plane of projection;

forming data showing whether each polygon is visible or invisible from each visual point on the basis of the results of

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said identification;

forming a plurality of object data by making the same or similar patterns into a group in accordance with a data pattern of each polygon, the data representing whether the polygon is visible or
5 invisible from each visual point; and

forming an object table representing object data as seen from each visual point.

27. A medium with a program stored thereon, the program for
10 having a computer system execute each step according to claim 25.

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